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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/511,358	02/23/2000	Hiraku Kozuka	35.C14298	4155

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EXAMINER

LOUIE, WAI SING

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/511,358

Applicant(s)

KOZUKA ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 11-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Applicant elects Group I, claims 1-10 and 17, which is drawn to a semiconductor photodiode. Applicant argues that the restriction is improper. However, Group II, claims 11-13, is an image sensor which is a plurality of photodiodes arranged in an array and Group III, claims 14-16, is an image input system which requires the image sensor of Group II and the integrated circuit together in order to function as a system (see specification fig. 6). The invention of Group I, on the other hand, would be function independently as a photodiode or incorporating into other system. Therefore, the restriction is proper.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhara et al. (US 6,043,550).

With regard to claim 1, Kuhara et al. disclose a photodiode (col. 10, line 28 to col. 24, line 9 and fig. 11) comprising:

- A first conductivity type first semiconductor region 54 (col. 9, line 32 and fig. 11). Although, Kuhara et al. does not disclose the first semiconductor region is

located in a pixel region. However, Kuhara et al. disclose a same device as the claimed invention in the present application. Therefore, first semiconductor region 54 must be in a pixel region;

- A second conductivity type second semiconductor region 56 provided in the first semiconductor region 54 (col. 9, lines 34-35 and fig. 11). “Capable of accumulating photoelectric carrier in a floating state” is the intended use, which does not carry any patentable weight;
- A wiring 62 for electrically connecting the second semiconductor region to a circuit element located outside the pixel region (fig. 11 and 16);
- A conductor 79 provided on the wiring 62 located inside the pixel region, via an insulator 75 (col. 14, lines 40-41 and fig. 16). “Capable of being kept at a stated potential” is the intended use, which does not carry any patentable weight.

With regard to claim 2, Kuhara et al. disclose the second semiconductor region is an island-shaped region surrounded by the first semiconductor region (fig. 11).

With regard to claims 8 and 9, Kuhara et al. do not disclose “the conductor have a width smaller than the width of the wiring” or “the conductor have a width larger than the width of the wiring”. However, It has been held in that the applicant must show that a particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Furthermore, the law is replete with cases in which when the mere difference between the claimed invention and the prior art is some dimensional limitation or other variable within the claims, patentability cannot be found. Moreover, the instant disclosure does not set forth

Art Unit: 2814

evidence ascribing unexpected results due to the claimed dimensions. See *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), which held that the dimensional limitations failed to point out a feature which performed and operated any differently from the prior art.

With regard to claim 10, Kuhara et al. disclose a terminal V_{pd} connected to a power source (fig. 28).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhara et al. (US 6,043,550) in view of Snyman et al. (US 6,111,271).

With regard to claim 3, Kuhara et al. disclose the island-shaped region surrounded by the first semiconductor region (fig. 11), but do not disclose the island-shaped region is surrounded by another second conductivity type semiconductor region. However, Snyman et al. disclose an island-shaped region 56 surrounded by a p-base region 58 (Snyman fig. 10). Snyman et al. teach the p+ region 56 embedded in the p-base region 59 to lower the avalanche breakdown (Snyman col. 8, lines 17-19). Therefore, it would have been obvious for the one with ordinary skill in the art to modify Kuhara et al. with the teaching of Snyman et al. to have a two parts second semiconductor region in order to prevent avalanche breakdown. Snyman et al. disclose the island-shaped region 56 is a p+ region and region 59 is a p- region. The impurity density of region 56 is higher than the impurity density of region 59 (Snyman fig. 10).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhara et al. (US 6,043,550) in view of Kozuka et al. (US 5,861,655).

With regard to claim 4, Kuhara et al. do not disclose the conductor is formed integrally with a light-screening layer provided for defining the pixel region. However, Kozuka et al. disclose a light-shielding layer (Kozuka fig. 1a). Kozuka et al. teach the light-shielding layer defines the pixel region (Kozuka col. 4, lines 63-65) and to prevent the false signal injected into the peripheral circuit (Kozuka cl5, lines 32-37). Therefore, it would have been obvious for the one with ordinary skill in the art to modify Kuhara et al. with the teaching of Kozuka et al. to provide a light-screening layer in order to define the pixel region and to prevent the false signal injected into the peripheral circuit.

Claims 5-7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhara et al. (US 6,043,550) in view of Isogai et al. (US 6,188,093).

With regard to claim 5, Kuhara et al. disclose the photodiode, but do not disclose the circuit element. However, Isogai et al. disclose the photodiodes form an array (Isogai fig. 7) and each pixel is associated with a circuit element, which is a MOS transistor (Isogai fig. 11). Isogai et al. teach the MOS control the excess charge generated by the photodetector (Isogai col. 26, line 63 to col. 27, line 4). Therefore, it would have been obvious for the one with ordinary skill in the art to modify Kuhara et al. with the teaching of Isogai et al. to provide a MOS in the circuit in order to control the excess charges generated by the photodiode.

With regard to claim 6, Kuhara et al. modified by Isogai et al. in claim 5 above would disclose the circuit comprises a resetting (MOS) switch and an amplifying transistor (Isogai col. 16, line 66 to col. 17, line 10 and col. 19, lines 43-50). The function of the resetting switch and the amplifier do not carry any patentable weight.

With regard to claim 7, Kuhara et al. modified by Isogai et al. in claim 5 above would disclose a buffer amplifier, which is superior in noise reduction (Isogai col. 39, line 60 to col. 40, line 2).


With regard to claim 17, Kuhara et al. modified by Isogai et al. in claim 5 above would disclose the conductor 310 extends into a substantially square opening in the pixel region 306 and the wiring 309 located inside the pixel region 2 (Isogai fig. 43 & 44).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

wsf
May 18, 2003


LONG PHAM
PRIMARY EXAMINER